Human dimensions of the Saskatchewan Forest Habitat Project

B.L. McFarlane and B.J. Macnab

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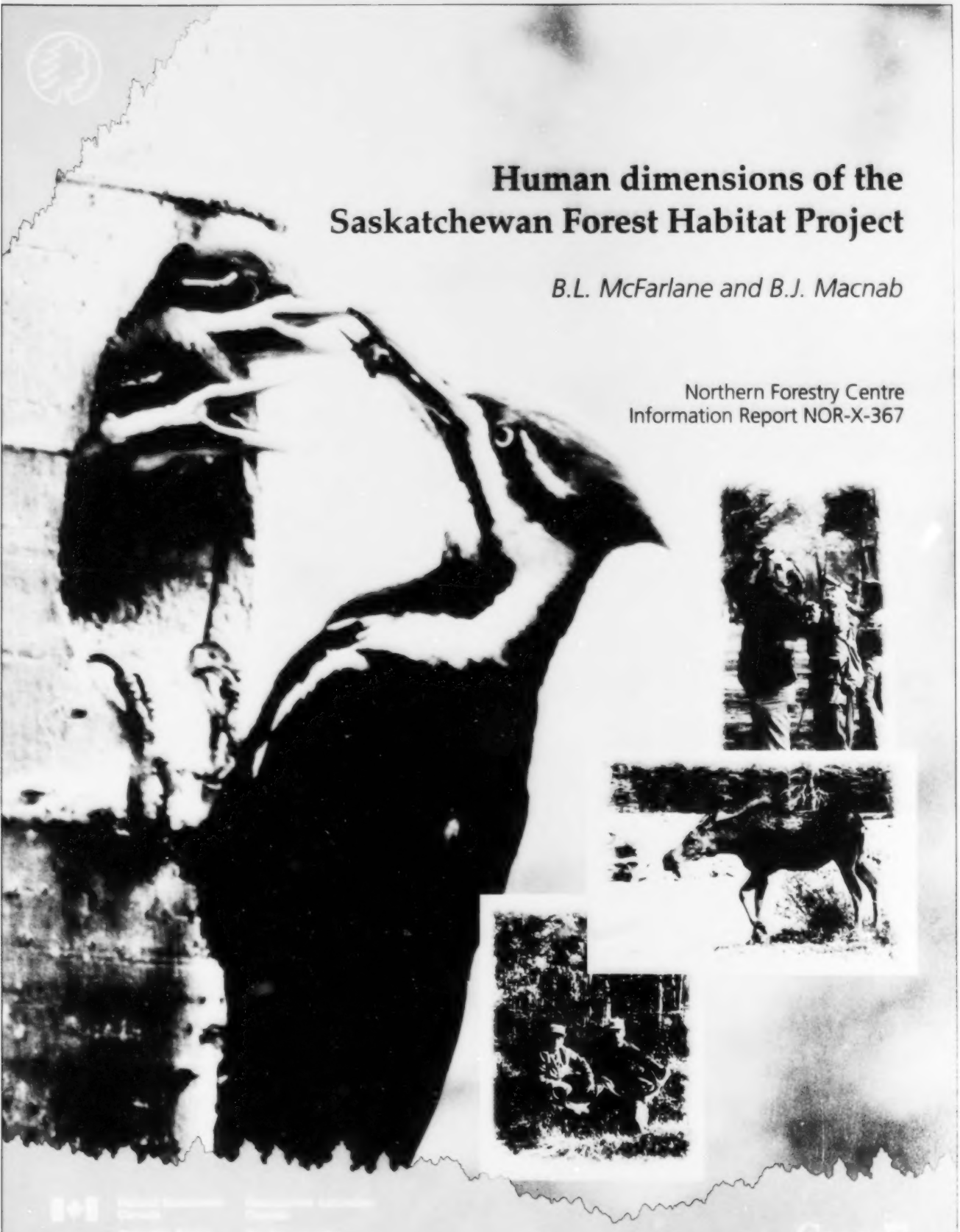

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ABSTRACT

The Saskatchewan Forest Habitat Project (SFHP) was undertaken to help integrate timber and wildlife management objectives into forest management practices in the Weyerhaeuser Saskatchewan Limited Forest Management License Agreement (FMLA) area. Habitat supply models, which use the concept of indicator species, were developed for six of the approximately 250 species of birds and mammals found in the FMLA area. An important component of assessing the viability of the SFHP is determining its impacts on stakeholders. A study was undertaken to examine two user groups (wildlife viewers and moose hunters), their use of the FMLA area, and the potential impact of habitat supply models on their activities. Mail surveys were used to collect information on wildlife use, attitudes toward wildlife, and viewing and hunting preferences. Both groups were similar in terms of some socioeconomic characteristics, attitudes toward wildlife, and reasons for participating, but differed in terms of the factors that detracted from their wildlife experiences. The Weyerhaeuser FMLA area is important for viewing and hunting activities. However, simply managing for species and their habitat may not meet the demands of these users. Incorporating an experience-based management framework with habitat supply models may be necessary to meet their needs.

RÉSUMÉ

Le projet de gestion de l'habitat forestier de la Saskatchewan (PGHFS) a été entrepris pour faciliter l'intégration des objectifs de gestion des forêts et de la faune aux pratiques d'aménagement forestier sur le territoire visé par l'Entente relative à la licence d'aménagement forestier (ELAF) de la Weyerhaeuser Saskatchewan Limited. Des modèles de la disponibilité de l'habitat fondé sur le concept d'espèces indicatrices ont été élaborés à l'égard de six des quelque 250 espèces d'oiseaux et de mammifères qui habitent le territoire visé par l'ELAF. L'identification des impacts sur les intervenants est un volet important de l'évaluation de la viabilité du PGHFS. Nous avons entrepris d'étudier deux groupes d'utilisateurs (les observateurs de la faune et les adeptes de la chasse à l'orignal), leur utilisation du territoire visée par l'ELAF et l'impact éventuel des modèles de la disponibilité de l'habitat sur leurs activités. Des enquêtes postales nous ont permis de recueillir de l'information sur l'utilisation de la faune, sur les attitudes envers la faune ainsi que sur les préférences en matière d'observation et de chasse. Les caractéristiques socioéconomiques, les attitudes envers la faune et les raisons de leur participation étaient similaires chez les deux groupes, contrairement aux facteurs gâchant leur expérience avec la faune. Le territoire visé par l'ELAF de la Weyerhaeuser est le siège de nombreuses activités d'observation et de chasse. Toutefois, une gestion uniquement axée sur les espèces et leur habitat peut ne pas répondre aux demandes de ces utilisateurs. Pour y arriver, il faudra peut-être intégrer aux modèles de la disponibilité de l'habitat un cadre de gestion basé sur l'expérience.

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INTRODUCTION

In recent years, public forest lands have been subject to increased demands from a wide range of users and stakeholders. As such, when forest management practices are developed, the variety of benefits that the forest provides must be kept in mind. Specifically, the values of forests for timber production must be considered in light of other forest uses such as wildlife viewing, hunting, subsistence use, and camping.

The concept of integrated resource management (IRM) is, in part, a response to the increasing demands on forest resources. With IRM, attempts are made to manage resources so that a wide range of uses and objectives can be accommodated. In the case of public forest lands, the focus might be to address factors such as timber production, recreation, subsistence use, watershed services, and biodiversity within management plans and practices (Hoekstra 1988; Kimmins 1995).

The Saskatchewan Forest Habitat Project (SFHP) was undertaken as an IRM initiative to integrate the objectives of timber production and wildlife management. The SFHP was founded in 1989 as a joint venture of Weyerhaeuser Saskatchewan Limited, Wildlife Habitat Canada, the Saskatchewan Wildlife Federation, Saskatchewan Environment and Resource Management, Prince Albert National Park, the Canadian Forest Service, and the Federation of Saskatchewan Indian Nations. The primary goal of the project was to integrate both timber and wildlife management objectives in the forest planning process (Terrestrial and Aquatic Environmental Managers Ltd. 1996). As such, forest management practices strive to provide suitable habitat for a wide range of wildlife species while maintaining the economic viability of the forest industry.

One approach that has been developed to incorporate wildlife in forest management strategies is the use of indicator species (Noss 1990). The goal of this approach is to provide suitable habitat for a specific complement of species. Theoretically, by managing for the habitat requirements of the indicator species, suitable habitat is also provided for a variety of other species with similar habitat requirements. The success of this approach depends on careful selection of the indicator species. Specifically, the species chosen should represent as wide a range of vegetation types and successional stages as possible.

Six species were chosen as indicators for the SFHP. The species were selected on the basis of their value as indicators of habitat change and their economic and social importance (Terrestrial and Aquatic Environmental Managers Ltd. 1996). The species selected and the rationale for their inclusion were as follows:

1) moose (*Alces alces*): early successional habitats, high economic value;
2) woodland caribou (*Rangifer tarandus caribou*): mature and overmature coniferous forests, social value;
3) pileated woodpecker (*Dryocopus pileatus*): mature mixed-wood and coniferous forests, high social value;
4) ovenbird (*Seiurus aurocapillus*): mature hardwoods, vulnerable;
5) beaver (*Castor canadensis*): riparian habitats, high economic and social value;
6) snowshoe hare (*Lepus americanus*): successional mixed-wood forests, high economic value.

An important component of assessing the viability of IRM approaches in projects such as the SFHP, is determining their impact on stakeholders. A study was therefore undertaken to examine the impacts of the SFHP on two forest and wildlife user groups; wildlife viewers and moose hunters. This report examines the characteristics of wildlife viewers and moose hunters, the intensity of wildlife viewing and moose hunting in the Weyerhaeuser FMLA area, and the potential impact of the SFHP on the two stakeholder groups.

METHODS

Study Area

The SFHP was conducted within the 5 million ha of the Weyerhaeuser Saskatchewan Limited FMLA area. This FMLA area is located in the northern forest of Saskatchewan, in the Boreal Plains and Boreal Shield ecozones. The majority of the area is characterized as Mid-Boreal Upland, with smaller

sections in the Mid-Boreal Lowland, Boreal Transition, and Churchill River Upland ecoregions (Terrestrial and Aquatic Environmental Managers Ltd. 1996). Primary study sites within the FMLA area were selected to develop and test wildlife habitat models for the indicator species.

The Mid-Boreal Upland ecoregion is characterized by loamy gray soils (Acton et al. 1990). Typical tree species in the area include aspen (*Populus tremuloides*), white spruce (*Picea glauca*), black spruce (*Picea mariana*), jack pine (*Pinus banksiana*), and tamarack (*Larix laricina*). The FMLA area is relatively diverse in terms of birds and mammals, containing approximately 250 species (Saskatchewan Forest Habitat Project 1992).

Stakeholder Samples

Many forest user groups could be affected by changes in forest management. Because the SFHP focuses on the supply of wildlife species, two user groups were chosen to represent a spectrum of wildlife user interests: wildlife viewers (nonconsumptive) and moose hunters (consumptive).

Wildlife viewers were chosen as the nonconsumptive user group for two reasons. First, wildlife viewing is an important activity in Saskatchewan. For example, in 1991, 16% of residents over the age of 15 years took at least one trip for which the primary purpose was to watch, photograph, feed, or study wildlife (Filion et al. 1993). Second, a focus on wildlife viewers relates to the demand for viewing the indicator and associated benefiting species. The six indicator species for the SFHP may represent up to 250 species of forest birds and mammals (Saskatchewan Forest Habitat Project 1992). This total includes many species of interest to wildlife viewers. For example, six species of owls and 16 species of wood warblers are potential benefiting species.

Even though wildlife viewing is an important wildlife-related activity, wildlife viewers are a relatively difficult group to study. Hunters are easily identified through government licensing records. However, wildlife viewers do not require a license, specialized facilities, certification, or specialized training to carry out their activities. Thus, a comprehensive record of wildlife viewers was not available. To obtain an adequate sample of wildlife viewers, all 933 members of a provincial natural history organization, Nature Saskatchewan, were contacted for the study. Nature Saskatchewan has a province-wide membership and is concerned with the conservation and appreciation of Saskatchewan flora and fauna. Members of Nature Saskatchewan may not be representative of all wildlife viewers in the province. However, people belonging to nature organizations tend to be those most involved in recreational activities and interested in conservation (Dennis and Zube 1988; McFarlane and Boxall 1996) and, therefore, may be the most sensitive to changes in forest and wildlife management.

The Weyerhaeuser FMLA area is important for recreational hunting and fishing. Moose hunters were chosen to represent the consumptive constituent for a several reasons. First, moose is one of the indicator species in the SFHP. Second, moose hunting is concentrated in the forested regions of the province. Thus, changes in moose populations in the FMLA area may significantly affect moose hunting opportunities in Saskatchewan because there are few substitute hunting sites. In contrast, deer hunting occurs throughout the province, especially in the parkland and grassland ecoregions to the south. Changes in deer populations on the FMLA area may have much less impact on deer hunting in the province because of the availability of substitute hunting sites throughout the province. Third, recreational fishing was thought to be less affected than hunting by the management changes proposed by the SFHP. Although there are many recreational fishing sites in the area, they may be much less affected by the SFHP management prescriptions because riparian areas were excluded from timber harvest by industry guidelines and practices within the FMLA.

A sample of 1500 people who held a hunting license in 1993 was obtained from the provincial government licensing agency. Of these, 1274 held a moose license in 1993 and were included in the study. To ensure that hunters who hunted in the Weyerhaeuser FMLA area were included, those residing in a number of small communities in the vicinity (for example, Prince Albert, Melfort, Meath Park, Smeaton, and Choiceland) were oversampled. The remainder of the sample consisted of hunters from Regina, Saskatoon, and Moose Jaw.

Survey Design

Separate questionnaires were developed to assess the effects of changes in forest management instituted by the SFHP on wildlife viewing and moose hunting. The questionnaires collected information on socioeconomic characteristics, attitudes toward

wildlife, reasons for participating, factors detracting from the experience, characteristics of viewing and hunting trips, information to assess the nonmarket values of viewing and hunting, and perceptions of conditions in viewing and hunting areas.

Attitudes toward wildlife were measured with the Wildlife Attitudes and Values Scale (WAVS) (Purdy and Decker 1989). The WAVS was developed to assess the social values of wildlife and has proven useful in planning and management actions. The WAVS represents three broad groups of attitudes: societal benefits, traditional conservation, and problem acceptance. Societal benefits statements relate to the social and ecological significance of wildlife. Traditional conservation statements relate to managing wildlife primarily for consumptive purposes, emphasizing game species and economic opportunities associated with wildlife. Problem acceptance statements relate to the acceptance of dangers and nuisances associated with some wildlife. Respondents rated 18 attitude statements on a seven-point scale, which ranged from "strongly disagree" (1) to "strongly agree" (7).

Reasons for participating in viewing or hunting trips were derived from Decker and Connelly (1989) and McFarlane (1994) and were classified as appreciative-, social-, or achievement-oriented reasons. The appreciative-oriented reason consisted of the overall experience of being in a wilderness or forested setting. The social-oriented reason consisted of companionship of friends, family, or relatives. For the viewing sample, achievement-oriented reasons included seeing as many different species as possible, seeing a species never seen before, and seeing a rare or endangered species. For the hunter sample, achievement-oriented reasons included shooting a trophy animal and putting meat in the freezer. Respondents ranked the reasons from the most to the least important. The reason ranked as most important was considered the respondent's primary reason for participating.

Detractors from the viewing or hunting experience were determined by having respondents rank a list of items. The items related to encounters with other people, resource development such as forestry and oil and gas activities, moving from traditional hunting areas, and the presence of wolves in hunting areas. The item ranked as detracting the most from the viewing or hunting experience was considered the primary detractor.

Both questionnaires were mailed in July 1994. A reminder postcard was sent about 3 weeks later. About 6 weeks after the initial mailing, a second questionnaire was sent to those who had not responded.

RESULTS

Survey Response

A total of 520 questionnaires were returned by the wildlife viewers and a total of 618 by the hunters, for response rates of 55.7% and 48.5%, respectively.

Wildlife Viewers

Socioeconomic Characteristics

A comparison with the 1991 national census data (Statistics Canada 1991) showed several differences between wildlife viewers and the general Saskatchewan population. Fifty-nine percent (307) of wildlife viewers and only 49.6% of the Saskatchewan population were male. Wildlife viewers tended to be older than hunters and the general population; 61.7% of the wildlife viewers were 50 years of age or older, whereas only 27.3% of hunters and 35.6% of the Saskatchewan population were in this age-group (Table 1).

Wildlife viewers had a high level of education (Table 2). For example, 76.9% of wildlife viewers indicated that they had completed either postsecondary education or a graduate degree.

Wildlife viewers tended to have higher household incomes than the general population. Wildlife viewers were underrepresented in the lower-income categories and overrepresented in the higher-income categories (Table 3). Only 17.5% of wildlife viewers had a household income of $20 000 or less, whereas 30.1% of provincial households earned this amount. About 50% of wildlife viewers and only 39.2% of Saskatchewan residents had a household income of more than $40 000.

Wildlife viewers also tended to be more urban than the Saskatchewan population. Half of the wildlife viewers but only 41.8% of the Saskatchewan population aged 15 years or older were from Saskatoon or Regina.

Table 1. Age of wildlife viewers, hunters, and the Saskatchewan population

Age	No. (and %) of wildlife viewers (n = 504)	No. (and %) of hunters (n = 605)	% of 1991 Saskatchewan population[a] (≥15 yr) (n = 738 675)
15–19	3 (0.6)	7 (1.2)	9.7
20–29	36 (7.1)	53 (8.9)	18.7
30–39	63 (12.5)	201 (33.2)	21.1
40–49	91 (18.1)	178 (29.4)	14.9
50–59	86 (17.1)	106 (17.5)	11.3
60–74	168 (33.3)	55 (9.0)	16.0
≥75	57 (11.3)	5 (0.8)	8.3

[a] Statistics Canada (1991).

Table 2. Education levels of wildlife viewers and hunters

Education level	No. (and %) of wildlife viewers (n = 515)	No. (and %) of hunters (n = 609)
Elementary or junior high school	30 (5.8)	75 (12.3)
High school (grades 10–12)	89 (17.3)	278 (45.6)
Post-secondary education	234 (45.4)	219 (36.0)
Graduate degree	162 (31.5)	37 (6.1)

Table 3. Household income for wildlife viewers, hunters, and the Saskatchewan population

Income level ($)	% of wildlife viewers (n = 475)	% of hunters (n = 566)	% of 1991 Saskatchewan households[a] (n = 363 150)
20 000	17.5	7.6	30.1
20 001–40 000	32.2	35.7	30.7
40 001–60 000	25.9	33.3	21.0
>60 000	24.4	23.4	18.2

[a] Statistics Canada (1991).

In summary, wildlife viewers were older, earned higher incomes, and included more urban residents than the general population. Although these users were not representative of the general population, they were similar to wildlife viewers in other studies. For example, birdwatchers in Point Pelee National Park, Ontario, and birdwatchers in Alberta were primarily middle-aged and well educated, and earned high incomes (Hvenegaard et al. 1989; McFarlane 1994). The results of our analysis suggest that the sample in this study might not be representative of all wildlife viewers in Saskatchewan, but it probably represents the most active viewers, who may be affected the most by changes in forest or wildlife management.

Other Viewer Characteristics

On average, wildlife viewers were members of 2.4 wildlife-related organizations. About two-thirds (67.6%) of the sample were members of two or more organizations, which suggested that most were members of organizations in addition to Nature Saskatchewan, the organization from which the sample was obtained.

Many respondents considered themselves relatively experienced wildlife viewers. Most considered themselves intermediate (37.8%) or advanced (22.5%) viewers, 12.4% considered themselves casual viewers and 27.3% considered themselves novice viewers. In a study of the general population in Alberta (Manecon Partnership 1991) a much lower percentage of wildlife viewers rated themselves as intermediate or advanced (31%). However, that study involved a random sample of Alberta households. A survey of Edmonton and Calgary participants in the 1988 Christmas bird count (Boxall and McFarlane 1993) showed that 42% of Edmonton participants and 72% of Calgary participants rated themselves as intermediate or advanced birdwatchers. These results give further evidence that this sample of wildlife viewers represents among the most active and knowledgeable viewers in the province.

A relatively large percentage of viewers (21.0%) had hunted in the previous 5 years which indicated that some of the wildlife viewers in the province were "dual users" of the wildlife resource, participating in both consumptive and nonconsumptive wildlife-related activities.

Attitudes toward Wildlife

Most wildlife viewers agreed with the attitude statements relating to societal benefits (Table 4). For example, over 95% appreciated the role of wildlife in nature, considered the presence of wildlife as a sign of environmental quality, and agreed that wildlife should be included in educational materials about nature. Most also thought it important to learn about the behavior of wildlife, observe wildlife, see representations of wildlife in books and other media, and express opinions about wildlife to public officials. Most of the wildlife viewers also agreed with the problem acceptance statements indicating a willingness to tolerate nuisances associated with wildlife. For example, most indicated that they would tolerate safety hazards, risk of disease, nuisance problems, and property damage problems posed by wildlife. In contrast, most wildlife viewers disagreed with 3 of the 5 statements relating to traditional conservation, indicating that they did not participate in hunting and trapping activities. However, more than half (67.1%) of the wildlife viewers agreed that game animals should be managed for an annual harvest, and 56.5% agreed that local economies should benefit from economic activity associated with wildlife-related recreation. These results suggest that although most wildlife viewers are not involved in consumptive activities, they are not necessarily opposed to traditional wildlife management that emphasizes game species and economic activity.

Reasons for Wildlife Viewing

Respondents were asked to rank a list of five reasons for viewing wildlife (Table 5). A majority (66.9%) ranked the overall experience of being in a wilderness setting as their primary reason for wildlife viewing trips. The next most important reason was seeing as many different species of wildlife as possible 19.2% ranking this as their primary reason. Seeing a species never seen before, companionship, and seeing a rare or endangered species were each ranked most important by less than 10% of the wildlife viewers. These results suggest that viewers take trips primarily as a means to enjoy nature. Achievement- and social-oriented reasons appear to be less important to this group of viewers.

Detractors from Wildlife Viewing

Three factors figured prominently in detracting from wildlife viewing trips: hearing or seeing hunters, hearing highway or off-highway vehicles, and seeing some evidence of logging (Table 6). Seeing evidence of seismic activity or cutlines and hearing or seeing other wildlife viewers were each ranked as most detracting by less than 10% of respondents. These results suggest that wildlife viewers may be sensitive to contact with other user groups, particularly

Table 4. Wildlife Attitudes and Values Scale (Purdy and Decker 1989) scores for wildlife viewers and hunters

Attitude category and statement[a]	% who agreed[b]		Mean rating[a] (SD)	
	Viewers	Hunters	Viewers	Hunters
Societal benefits				
I know that wildlife exists in nature	97.5	96.0	6.7 (0.9)	6.6 (0.9)
I appreciate the role that wildlife plays in the natural environment	97.9	95.6	6.7 (0.8)	6.5 (0.9)
I consider the presence of wildlife as a sign of the quality of the natural environment	96.9	94.7	6.6 (0.9)	6.5 (1.0)
Wildlife are included in educational materials as a subject for learning about nature	97.1	92.7	6.6 (0.9)	6.3 (1.1)
I understand more about the behavior of wildlife	92.5	91.6	6.3 (1.1)	6.3 (1.1)
I talk about wildlife with family and friends	79.7	78.1	5.7 (1.4)	5.7 (1.4)
I observe or photograph wildlife	87.1	76.7	6.0 (1.3)	5.6 (1.6)
I see wildlife in books, movies, paintings, or photographs	77.8	76.4	5.6 (1.4)	5.6 (1.5)
I express opinions about wildlife and their management to public officials or to officers of private conservation organizations	61.1	68.1	5.0 (1.7)	5.3 (1.6)
Traditional conservation				
Game animals are managed for an annual harvest for human use without harming the future of the wildlife population	67.1	94.1	5.2 (1.8)	6.5 (1.1)
Local economies benefit from the sale of equipment, supplies, or services related to wildlife recreation	56.5	77.4	4.7 (1.7)	5.6 (1.7)
I hunt animals for food	23.5	80.3	2.7 (2.2)	5.8 (1.5)
I hunt animals for recreation	17.8	69.5	2.2 (2.1)	5.3 (2.0)
I trap furbearing mammals for the sale of furs or pelts	9.3	23.7	2.0 (1.6)	3.2 (2.1)
Problem acceptance				
I tolerate the ordinary personal safety hazards associated with some wildlife	85.9	83.5	5.8 (1.3)	5.8 (1.4)
I tolerate the ordinary risk of wildlife transmitting disease to humans or domestic animals	72.9	56.2	5.3 (1.6)	4.6 (1.9)
I tolerate most wildlife nuisance problems	72.1	60.6	5.2 (1.5)	4.8 (1.8)
I tolerate most levels of property damage by wildlife	67.3	52.6	5.0 (1.6)	4.6 (1.7)

[a] Each statement began with the phrase "It is important to me personally that ...." Respondents rated each statement on a seven-point scale where 1 = strongly disagree and 7 = strongly agree.

[b] Rated statement >4.0.

Note: SD = standard deviation.

Table 5. Rankings of reasons for viewing wildlife

Reason	Rank[a] (% of respondents)					
	1	2	3	4	5	*n*
The overall experience of being in a wilderness setting	66.9	11.6	6.0	8.0	7.5	414
Seeing as many species of wildlife as possible	19.2	31.7	23.8	9.0	16.4	391
Seeing a species never seen before	6.5	18.4	35.2	31.6	8.3	386
Companionship of friends, family, or relatives	6.4	25.4	18.1	14.8	35.4	393
Seeing a rare or endangered species	5.6	12.1	16.2	35.1	31.0	390

[a] Ranked from 1 to 5, where 1 = most important and 5 = least important.

Table 6. Rankings of items detracting from wildlife viewing experiences

Item	Rank[a] (% of respondents)					
	1	2	3	4	5	*n*
Hearing or seeing hunters	37.1	17.8	16.5	23.1	5.6	394
Hearing the sound of highway or off-highway vehicles	28.5	27.3	18.9	23.7	1.5	396
Seeing some evidence of logging	24.2	31.9	27.5	12.6	3.9	389
Seeing evidence of seismic activity or cutlines	8.2	19.6	31.4	30.4	10.3	388
Hearing or seeing other wildlife viewers	5.6	2.8	5.4	9.0	77.2	391

[a] Ranked from 1 to 5, where 1 = most detracting and 5 = least detracting.

hunters and those using off-highway vehicles, and logging activities. Encounters with other forest users might result in an unsatisfactory viewing experience or conflict between wildlife viewers and other users of the land base.

Preferred Viewing Site

Respondents were asked to list their preferred wildlife viewing area in Saskatchewan. A few areas dominated as preferred viewing sites. Prince Albert National Park and the Cypress Hills were the preferred viewing sites of 14.1% and 12.7% of respondents, respectively. Other popular areas included Last Mountain Lake (6.3%), the Qu'Appelle River Valley (5.4%), and the city of Saskatoon (4.4%).

Wildlife Viewing Trip Information

Participation

Respondents completed a trip log for wildlife viewing trips taken in 1993. The information collected included the wildlife viewing site, the number of trips taken to the site, the length of the trip (in days), the distance traveled, the main species of interest, and the primary activities carried out at the site. The log included trips anywhere in Saskatchewan for the purpose of viewing any species. A substantial percentage (22.9%) of respondents did not report any wildlife viewing trips in 1993. However, those who reported trips were quite active. Respondents reported a total of 4282 trips and traveled a total of 507 185 km to view wildlife. The mean number of trips was 10.7, and the mean total distance was 2536 km. The mean distance of a trip was 236 km. A total of 8281 days was spent on viewing trips. The mean total number of days on trips was 20.7, and the mean length of a trip was 1.9 days.

Trip Descriptions

Trip descriptions referred to unique trips to viewing sites entered in the trip logs. A trip description did not account for multiple trips of a similar nature to the same site by a respondent. For example, if a respondent took three weekend birdwatching

trips to Prince Albert National Park, the entry was considered as one trip description.

Of the 401 respondents who took a trip, 26.9% completed one trip description, 17.0% completed two, 16.5% completed three, 14.7% completed four, and 24.9% completed five or more. In total, there were 1293 trip descriptions for 282 wildlife viewing sites in Saskatchewan.

Primary Activities and Species

Respondents participated in a variety of activities while on viewing trips (Table 7). Birding was the most popular, occurring in 40.6% of the trip descriptions. Other popular activities included general wildlife viewing (13.5%), viewing of vegetation (9.0%), camping (9.0%), and hiking (8.9%). Most of the respondents who took trips listed several activities which suggested that meeting the needs of wildlife viewers may require managing for several activities in conjunction with wildlife viewing opportunities.

Respondents sought a variety of species on viewing trips (Table 8). Birds were the most commonly mentioned group, occurring in 61.2% of the trip descriptions. Other groups frequently mentioned included all species (14.3%), mammals (11.7%), and vegetation (10.3%).

Trips in Saskatchewan

Of the 282 viewing sites listed in the trip descriptions, 143 appeared only once. Only 50 sites were mentioned at least 5 times. Although respondents visited many sites, a few were popular. Prince Albert National Park (98 trip descriptions), Last Mountain Lake (94), and the Cypress Hills (73) were the most popular (Table 9). Other important sites included Pike Lake Provincial Park, Quill Lake, Moose Mountain Provincial Park, the Qu'Appelle River Valley, Candle Lake Provincial Park, the Great Sand Hills, Grasslands National Park, and Buffalo Pound Provincial Park. Each of these sites was mentioned 20 times or more.

Table 7. Participation in activities while on wildlife viewing trips

Activity	No. (and %) of responses (n = 2092)
Birding	849 (40.6)
General wildlife viewing	282 (13.5)
Viewing vegetation	188 (9.0)
Camping	188 (9.0)
Hiking	187 (8.9)
Fishing	80 (3.8)
Canoeing	76 (3.6)
Geology	71 (3.4)
Other	171 (8.2)

Table 8. Species sought on wildlife viewing trips

Species	No. (and %) of responses (n = 1946)
Birds	1190 (61.2)
All species	277 (14.3)
Mammals	220 (11.7)
Vegetation	200 (10.3)
Fish	19 (1.0)
Amphibians	18 (0.9)
Fossils or butterflies	11 (0.6)

Table 9. Wildlife viewing trips to popular sites in Saskatchewan

Site[a]	No. (and %) of trip descriptions (n = 1293)
Prince Albert National Park	98 (7.6)
Last Mountain Lake	94 (7.3)
Cypress Hills	73 (5.6)
Pike Lake Provincial Park	34 (2.6)
Quill Lake	32 (2.5)
Moose Mountain Provincial Park	30 (2.3)
Qu'Appelle River Valley	29 (2.2)
Candle Lake Provincial Park	25 (1.9)
Great Sand Hills	25 (1.9)
Grasslands National Park	24 (1.8)
Buffalo Pound Provincial Park	20 (1.5)

[a] Sites with ≥20 site trip descriptions are reported.

Trips to the Weyerhaeuser FMLA Area

The Weyerhaeuser FMLA area and four nearby protected areas (Prince Albert National Park, Candle Lake Provincial Park, Lac la Ronge Provincial Park, and Narrow Hills Provincial Park) were important wildlife viewing sites. Almost 18% (229) of all trip descriptions were to FMLA areas. The four protected areas accounted for approximately two-thirds of all trip descriptions in the FMLA area (Table 10). Of the 76 trip descriptions for sites outside the protected areas in the FMLA area, the most commonly listed sites were Besnard Lake (14 descriptions), Emma Lake (12), and Anglin Lake (11).

Table 10. Wildlife viewing trips to the Weyerhaeuser Forest Management License Agreement area and nearby protected areas

Site[a]	No. (and %) of trip descriptions (n = 231)
Prince Albert National Park	98 (42.4)
Candle Lake Provincial Park	25 (10.8)
Lac la Ronge	18 (7.7)
Besnard Lake	14 (6.0)
Narrow Hills Provincial Park	12 (5.2)
Emma Lake	12 (5.2)
Anglin Lake	11 (4.7)
Big River	9 (3.9)
Christopher Lake	6 (2.5)
Doré Lake	5 (2.1)
Chitek Lake	4 (1.7)
Wapawekka Lake	3 (1.2)
Weyakwin Lake	3 (1.2)
Little Bear Lake	3 (1.2)
Green Lake	2 (0.9)
Clarke Lake	2 (0.9)
Big Sandy Lake	1 (0.4)
Montreal Lake	1 (0.4)
Lac la Plonge	1 (0.4)
White Swan Lakes	1 (0.4)
Leadley Lake	1 (0.4)
East Trout Lake	1 (0.4)

Respondents were asked how many viewing trips they had taken in the previous 5 years (1989 to 1993) to specific sites in the FMLA area. The results suggested relatively high viewing participation in the previous 5 years (Table 11). Prince Albert National Park was the most frequently visited area, receiving 1194 visits or about a third of all viewing trips to the area. Wildlife viewers had taken a total of 3127 trips to the FMLA area, the four nearby protected areas, and Meadow Lake Provincial Park in the previous 5 years.

Trips to Ecozones and Ecoregions

The trip description sites for wildlife viewing were categorized into the ecozones and ecoregions they occupy. Ecoregions are characterized as areas with distinctive regional climates, as expressed by vegetation (Beckingham et al. 1996). Ecozones, represent a higher functional unit, and a number of ecoregions, with general similarities in climate and vegetation, typically make up an ecozone. Identifying the number of trips to ecozones and ecoregions provides an indication of the type of wildlife habitat preferred by wildlife viewers.

Most (64.4%) of the trip descriptions referred to the Prairies ecozone (Table 12). This is not surprising considering that more than 50% of the wildlife viewers resided in Saskatoon or Regina, both of which are located in the Prairies ecozone. Almost one-third (31.4%) of the trip descriptions referred to the Boreal Plains ecozone, which includes most of the FMLA area. Considerably fewer descriptions referred to more remote northern ecozones of the Boreal Shield (4.1%) and the Taiga Shield (0.1%).

At the ecoregion level, the largest percentage (29.9%) of trip description sites were in the Moist Mixed Grassland ecoregion (Table 13). The Mid-Boreal Upland was the next most prominent ecoregion with 24.4% of the trip description sites. The Mid-Boreal Upland ecoregion is characteristic of most of the FMLA area, which suggests that the area contains habitat for species sought by wildlife viewers.

These results and those in the previous section suggest that the FMLA area and nearby protected areas are supplying important wildlife viewing habitat and contain important wildlife viewing sites. Changes in natural resource management in the area could have a substantial impact on wildlife viewing opportunities in Saskatchewan.

Table 11. Wildlife viewing trips to the Weyerhaeuser Forest Management License Agreement area and nearby protected areas from 1989 to 1993

Destination	Total no. of trips	Mean no. of trips/respondent
Prince Albert National Park	1194	2.32
Lac la Ronge Provincial Park	347	0.67
East Trout, Montreal, and White Swan lakes area	316	0.61
Candle Lake Provincial Park	270	0.52
Big River, Cowan River, and Green Lake area	254	0.49
Meadow Lake Provincial Park	190	0.37
Doré, Smoothstone, and Delaronde lakes area	148	0.29
Narrow Hills Provincial Park	144	0.28
Big Sandy, Little Bear, and White Gull lakes area	140	0.27
Besnard, Egg, and Wapawekka lakes area	124	0.24

Table 12. Wildlife viewing trips to ecozones in Saskatchewan

Ecozone	No. (and %) of trip descriptions (n = 1223)
Prairies	788 (64.4)
Boreal Plains	384 (31.4)
Boreal Shield	50 (4.1)
Taiga Shield	1 (0.1)

Table 13. Wildlife viewing trips to ecoregions in Saskatchewan

Ecoregion	No. (and %) of trip descriptions (n = 1223)
Moist Mixed Grassland	366 (29.9)
Mid-Boreal Upland	298 (24.4)
Mixed Grassland	177 (14.4)
Aspen Parkland	171 (14.0)
Cypress Upland	74 (6.1)
Boreal Transition	56 (4.6)
Churchill River Upland	47 (3.8)
Mid-Boreal Lowland	39 (2.5)
Athabasca Plain	3 (0.2)
Tazin Lake Upland	1 (0.1)

Moose Hunters

Socioeconomic Characteristics

Comparison of our data with the 1991 census data for Saskatchewan residents 15 years of age and older, (Statistics Canada 1991) illustrated some differences between moose hunters and the general Saskatchewan population. Hunters were almost exclusively male (99.2%) whereas only 50% of the Saskatchewan population was male.

Among hunters there was a disproportionate number of people 30 to 59 years of age (Table 1). This group represented 79.7% of moose hunters but only 47.2% of the Saskatchewan population. There was an underrepresentation of hunters in the two youngest age-groups and the two oldest age-groups. About 10% of hunters were 29 years of age or younger, whereas about 28% of the provincial population was this age; similarly, about 10% of hunters were 60 years of age or older, and about 24% of the provincial population was this age.

Hunters were not as well-educated as wildlife viewers (Table 2). About 42% of hunters had completed either post secondary education or a graduate degree compared to 76.9% of wildlife viewers.

Household income also showed a divergence between moose hunters and the general population (Table 3). The household income of hunters was higher than that of the general population. Only 7.6% of the hunters had a household income of

$20 000 or less, whereas 30.1% of Saskatchewan household were in this income category.

In summary, the moose hunters in this sample were almost exclusively male, had higher incomes than the Saskatchewan population, and were not as well educated as wildlife viewers.

Attitudes toward Wildlife

Most of the hunters agreed with four of the attitude statements relating to traditional conservation; however, only 3.7% agreed that it was important to them to trap furbearing animals (Table 4). Most hunters agreed on the importance of hunting for food (80.3%) and recreation (69.5%), and of game animals being managed for an annual harvest (94.1%), and most agreed that local economies should benefit from wildlife-related recreation (77.4%). Four of the five statements with the highest level of agreement from hunters were in the societal benefits category. Statements relating to the societal benefits of wildlife, which reflect its existence in nature and its role in the environment, generally rated greater agreement than statements about hunting for food or recreation. Similar to wildlife viewers, over 90% of hunters appreciated the role of wildlife in nature, considered the presence of wildlife as a sign of environmental quality, and agreed that wildlife should be included in educational materials about nature. A majority also thought it important to learn about the behavior of wildlife, observe wildlife, see representations of wildlife in books and other media, and express opinions about wildlife to public officials. Hunters were generally tolerant of problems associated with wildlife: more than 50% agreed with the problem acceptance statements. For example, most would tolerate safety hazards, risk of disease, nuisance problems, and property damage problems posed by wildlife.

Reasons for Hunting

Respondents were asked to rank four reasons for participating in hunting. The overall experience of being in a forested setting was ranked as the most important reason by 39.6%, putting meat in the freezer was ranked most important by 31.0%, and the companionship of friends, family, or relatives was ranked most important by 25.7% (Table 14). Shooting a trophy animal was ranked most important by only 3.9% of respondents and was ranked least important by 72.4%. These results suggest that enjoying nature is more important to moose hunters than achievement-oriented reasons such as meat and trophies or the social aspects of the hunting experience.

Detractors from Hunting

The respondents were asked to rank six items according to their potential to detract from a hunting experience. Having to move to a new area to hunt was ranked the most detracting by 40.1% of respondents (Table 15). Hearing shots and voices or seeing other hunters (19.6%), hearing the sound of off-highway vehicles (16.7%), and seeing other people who are not hunters (12.4%) were also important detractors. Seeing evidence of logging and hearing wolves were each ranked as most detracting by less than 10% of hunters. Wolves had the least potential to detract from the hunting experience, 61.6% of respondents ranking this as the least detracting of the six items. These results show that having to move from traditional hunting areas and contact with other hunters through hearing off-highway vehicles, shots, and voices may have a negative impact on the moose hunting experience.

Preferred Wildlife Management Zones

The respondents were asked to identify their preferred wildlife management zone (WMZ) in Saskatchewan. WMZ 59 was the preferred hunting

Table 14. Rankings of reasons for hunting

Reason	Rank[a] (% of respondents)				*n*
	1	2	3	4	
The overall experience of being in a forested setting	39.6	29.6	20.9	9.9	497
Putting meat in the freezer	31.0	23.0	34.7	11.0	513
Companionship of friends, family, or relatives	25.7	41.7	25.9	6.8	499
Shooting a trophy animal	3.9	7.5	16.1	72.4	533

[a] Ranked from 1 to 4, where 1 = most important and 4 = least important.

Table 15. Rankings of items detracting from hunting experiences

Item	Rank[a] (% of respondents)						
	1	2	3	4	5	6	*n*
Having to move to a new area to hunt	40.1	14.4	12.3	13.0	10.5	9.7	506
Hearing shots and voices or seeing other hunters	19.6	22.8	19.8	16.9	13.1	7.9	496
Hearing the sound of off-highway vehicles	16.7	19.0	23.3	22.5	13.4	5.2	485
Seeing other people who are not hunters	12.4	25.0	20.8	20.6	15.8	5.4	500
Seeing some evidence of logging	8.2	15.2	15.4	20.0	31.2	10.0	500
Hearing wolves	5.2	4.7	8.7	6.4	13.4	61.6	516

[a] Ranked from 1 to 6, where 1 = most detracting and 6 = least detracting.

area for over one-third of the respondents (Table 16). All other WMZs were the preferred hunting area for less than 10% of respondents each. The FMLA area appears to be important for big game hunting. WMZs with moderate or high representation in the FMLA area (WMZs 63, 64, 65, 66, and 67) were the preferred areas for a total of 28.1% of respondents.

Hunting Trip Information

Participation

Hunters provided a trip log of their big-game hunting trips in Saskatchewan during 1993. Information was collected on the WMZ visited, the number of trips taken to the WMZ, the species hunted, the distance traveled, the dates of the trips, the number in the hunting party, and the number of animals shot. The trip log included trips anywhere in Saskatchewan for the purpose of hunting any species.

A total of 567 respondents (91.7%) reported at least one big-game hunting trip in 1993. Respondents reported a total of 2428 trips and traveling a total of 822 414 km. The mean number of trips was 4.3, and the mean total distance was 1451 km. The mean distance for a trip was 388 km. The mean total number of days on trips was 12.8, and the mean length of a trip was 3.0 days.

Trip Descriptions

Trip descriptions referred to unique trips to the WMZs entered in the trip logs. A trip description did not account for multiple trips by a respondent to the same WMZ. For example, if a hunter took two weekend trips to hunt moose in WMZ 63 the entry was considered as one trip description.

In total there were 1036 trip descriptions. There was a wide range in the number of hunting trip descriptions per person. About a third of respondents reported one trip description, 17.6% reported two, and 45.4% reported three or more.

Species Hunted

Deer and moose were the most sought after species. Of the total number of species identified in the trip log, 46.3% were deer (white-tailed deer *Odocoileus virginianus*, mule deer *Odocoileus hemionus*, and unspecified deer) and 42.0% were moose (*Alces alces*). Elk (*Cervus elaphus*) was the third most popular species (6.0%), followed by antelope (*Antilocapra americana*) (4.2%) and bear (*Ursus americanus*) (1.5%).

Trips in Saskatchewan

Respondents went to many WMZs throughout the province (Table 17). WMZ 59 was the most popular area, representing 16.4% of all trip descriptions. This result is consistent with the finding that WMZ 59 was cited most frequently as the preferred hunting zone in the province (Table 9). Of the eight WMZs that were used most frequently, four are at least partially represented in the Weyerhaeuser FMLA area. WMZs 63 and 66 have high representation in the FMLA area and corresponded with 6.6% and 3.5% of all trip descriptions, respectively. In total, WMZs with high or moderate representation in the FMLA area accounted for 15.3% of all trip descriptions.

Table 16. Wildlife management zones (WMZs) preferred by hunters (n = 469)

WMZ[a]	Representation of WMZ in the Weyerhaeuser Forest Management License Agreement (FMLA) area[b]	No. (and %) of respondents preferring WMZ
59	None	164 (35.0)
56	None	46 (9.8)
63	High	44 (9.4)
60	None	38 (8.1)
66	High	36 (7.7)
67	Moderate	33 (7.0)
57	None	24 (5.1)

[a] All other WMZs were preferred by less than 5% of respondents each.

[b] Approximation of the area of the WMZ which falls within the FMLA. Low = less than 33% of the WMZ contained within the FMLA area, moderate = 33% to 66%, high = more than 66%.

Table 17. Hunting trips to popular wildlife management zones (WMZs) (n =1036 trip descriptions)

WMZ	Representation of WMZ in the Weyerhaeuser Forest Management License Agreement (FMLA) area[a]	No. (and %) of trip descriptions
59	None	167 (16.4)
56	None	76 (7.3)
63	High	68 (6.6)
57	None	62 (6.0)
67	Moderate	54 (5.2)
60	None	38 (3.7)
66	High	36 (3.5)
62	Low	23 (2.2)

[a] Approximation of the area of the WMZ which falls within the FMLA. Low = less than 33% of the WMZ contained within the FMLA area, moderate = 33% to 66%, high = more than 66%.

Trips to the Weyerhaeuser FMLA Area

Five WMZs have moderate or high representation in the FMLA area. Of the 462 hunting trips to these WMZs, the largest proportion (56.7%) was to WMZ 63. WMZ 67 received 21.0% of the FMLA area trips, WMZ 66 received 12.0%, and WMZs 64 and 65 each received about 5.0%. This indicates that hunting in the FMLA area is concentrated in specific WMZs and is not spread throughout the FMLA area. Moose and deer were the most popular species for respondents who hunted in the FMLA area: 45.0% hunted deer and 43.1% hunted moose, which suggests that providing moose habitat would be beneficial to these hunters.

Hunters were asked how many times they had hunted in 11 selected WMZs in the previous 5 years (1989 to 1993). WMZ 59 was again the most popular, with 37.5% of respondents having hunted there at least once in the previous 5 years, followed by WMZ 60 (15.3%) (Table 18). For WMZs 63, 67, and 66, all with high or moderate representation in the FMLA area, 13.8%, 10.8%, and 9.6% of respondents had hunted there at least once, respectively. In total, 45.4% of the trips to the 11 WMZs were to areas with moderate or high representation in the FMLA areas. WMZ 63 received 20.1% of the total trips and WMZs 67, 66, 65, and 64 each received 10% or less of the trips.

DISCUSSION

This study provides information on two recreational user groups, their use of the central forested region of Saskatchewan, and the potential impact of wildlife habitat supply models on their activities. Examining the characteristics of the user groups showed some similarities between wildlife viewers and moose hunters. Both groups tended to have higher levels of income than the general Saskatchewan population, and they tended to be middle-aged. Although wildlife viewers were slightly older than hunters, both groups were older than the general population.

Table 18. Hunting trips to the Weyerhaeuser Forest Management License Agreement (FMLA) area from 1989 to 1993

Wildlife Management Zone	Representation in the FMLA[a]	% of respondents taking at least one trip	% of respondents taking at least five trips	Total no. (and %) of trips
59	None	37.5	3.3	875 (34.0)
60	None	15.3	0.8	269 (10.5)
63	High	13.8	2.7	517 (20.1)
67	Moderate	10.8	1.7	265 (10.3)
66	High	9.6	0.3	160 (6.2)
62	Low	8.6	0.8	138 (5.4)
65	High	5.5	0.3	111 (4.3)
64	High	4.5	0.5	116 (4.5)
55	None	3.3	0.3	42 (1.6)
68	None	3.0	0.5	65 (2.5)
73	Low	1.7	0.0	14 (0.5)

[a] Approximation of the area of the WMZ which falls within the FMLA. Low = less than 33% of the WMZ contained within the FMLA area, moderate = 33% to 66%, high = more than 66%.

Both groups were similar in their attitudes toward wildlife. More hunters than wildlife viewers were in agreement with traditional conservation aspects of management. However, like wildlife viewers, hunters rated the societal benefits of wildlife as more important than traditional conservation. Although most wildlife viewers did not hunt, they were not opposed to managing game species for hunting. These results suggest that an indicator-species approach based on ecological principles and considering a wide range of uses and objectives, including game management, would be supported by both user groups.

The FMLA area is important for wildlife viewers and hunters and appears to have significant potential to benefit these stakeholders. Through the use of indicator species, the SFHP has the potential to provide further benefits to both user groups. Forest management that increases the populations of indicator species such as moose will undoubtedly benefit hunters. Similarly, the provision of habitat for a diversity of forest wildlife, especially birds, should benefit wildlife viewers.

Although wildlife species are important considerations for wildlife viewers and moose hunters, viewing and hunting experiences consist of more than the supply of species. Wilderness or nature experiences appeared to be important to both user groups. People watch or hunt wildlife as part of an overall experience with nature or wilderness. For viewers and hunters, achievement and social reasons for participating seem secondary to being in a natural setting. Therefore, at least some of the potential benefits of the SFHP will depend on how well it can provide the characteristics of natural settings. This may be of particular importance for a substantial portion of wildlife viewers, who indicated that logging activities detracted from their viewing experiences.

The importance of the FMLA area as a wildlife viewing location was highlighted by the substantial number of trips to the FMLA area and nearby protected areas. Although approximately two-thirds of these trips were to the protected areas, the results also suggest the importance of several sites within the FMLA area. In particular, Besnard Lake, Emma Lake, and Anglin Lake were important wildlife viewing sites. Hunters, off-highway vehicles, and logging exist at various locations and times in the FMLA area. These were ranked as the three top detractors for wildlife viewers. This might explain why viewers primarily visit protected areas near the FMLA area rather than sites where logging and

hunting may be occurring. Although managing for indicator species might be of potential benefit to viewers if it ensures the presence of a variety of species, it will probably take a concerted effort to attract viewers to the area. The potential for conflict with other users appears to be high and must be resolved before extensive viewing activities can take place. One common method of reducing potential conflict among users is to separate users both temporally and spatially. For example, hunting occurs during specific times of the year, so wildlife viewing opportunities could be promoted for seasons when hunting is not occurring on the land base; similarly, such opportunities could be promoted when logging activities are at a minimum. Sites within the FMLA area that might be excluded or subject to minimal logging, such as riparian habitat and other special areas, could be potential viewing sites.

The FMLA area is also important for big game hunters. WMZs with moderate or high representation within the FMLA area accounted for 24.1% of the preferred hunting areas and 15.3% of hunting trip descriptions. The FMLA area appears to be supplying desired opportunities for hunting. Deer and moose were the primary species hunted by those who used the FMLA area. Therefore, managing for moose habitat should be beneficial to these users. Although managing for moose habitat may be meeting the species requirements of hunters, there are other aspects of hunting that could be improved. Because hunting in the FMLA area is concentrated in two WMZs (63 and 67) and hunters ranked other hunters and off-highway vehicles among the top three items detracting from the hunting experience, there is potential for a sense of crowding and conflict among hunters. Promoting awareness of other deer and moose hunting opportunities within the FMLA area might help to improve the experience by dispersing hunters over a greater area. However, the item that detracted the most from hunting was having to move to new places to hunt. Hunters might be reluctant to try new hunting sites, and closure of sites within the FMLA area for logging or other activities could be disruptive to many hunters. The presence of logging was not a major detractor. Therefore, it might be possible to have hunting and logging activities in close proximity without detriment to the hunting experience.

Managing forests for a variety of habitat so as to provide a diversity of wildlife species is a response to social demands on forest and wildlife management. However, simply managing for species and their habitats may not be adequate to meet the demands of current wildlife users in the FMLA area. As for other recreation opportunities, planning for wildlife-related recreation opportunities should include managing species in particular settings to produce desired psychological outcomes (Driver 1985). This approach is an experience-based management framework and includes the preferred experience outcomes of users (such as solitude and nature appreciation), the activity (such as hunting and wildlife viewing), and the types of settings (involving biological factors, social conditions, and management actions) that are necessary for users to achieve their desired experiences (Manfredo and Larson 1993). This concept is a basic element in recreation planning and management but represents a new approach for industrial forest managers. To be successful, managers that are using wildlife habitat supply models to meet the needs of recreation stakeholders must manage species in particular settings to produce the desired psychological experiences of users. These settings should incorporate biological factors (for example particular habitat), social settings (such as, encounters with other users), and management actions (relating to access, regulations, and facilities) with the objective of providing opportunities for particular types of experiences. By concentrating on the supply of species, only one element (a biological factor) of the experience-based framework is being considered. Results from this study suggest that there are important social elements (such as encounters with off-highway vehicle users) and management actions (such as access to traditional hunting areas) that could affect the quality of wildlife recreation experiences in the FMLA area. Combining these with habitat supply models may be necessary to meet the needs of wildlife viewers and hunters.

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